

Classical Conditioning

What is Classical Conditioning and how does it work...

Conditioning involves learning associations between events that occur in an organism's environment. Classical Conditioning is a type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus.

The way that this is all supposed to work is actually simple. First, an unconditioned stimulus is paired with a neutral stimulus. The unconditioned stimulus is the one that is eliciting the unconditioned response. After a while, where this pairing is repeated many times, classical conditioning occurs. Now, the previous unconditioned stimulus is now the conditioned stimulus and can cause a conditioned response by itself. The unconditioned response and the conditioned response are essentially the same thing.

Basic Concepts in Classical Conditioning

Since Pavlov's time in the beginning of this century, research on classical conditioning has increased to a complexity level that is hardly comprehensible but to a few experts in the various fields this science has spawned. On the neurobiological side, research has come to a point where the molecular events can be traced that lead to the long lasting modification of the synapses responsible for the learning behavior in the animal. On the systemic side, psychologists have devised a plethora of behavioral experiments, the sophistication of which has steadily increased over the decades. With this wealth of data it was possible to develop mathematical models that predict the empirical findings to a rather astonishing extent. Today, neuronal nets have incorporated these models and developed them further. From molecules to behavior - the simple concept of classical conditioning has lead to an overwhelmingly successful multi-level approach to investigate into the mechanisms of learning.

Operant Conditioning

Classical conditioning forms an association between two stimuli. *Operant* conditioning forms an association between a behavior and a consequence. (It is also called *response-stimulus* or RS conditioning because it forms an association between the animal's response [behavior] and the stimulus that follows [consequence])

Four Possible Consequences

There are four possible consequences to any behavior. They are:

**Something Good can start or be presented;
Something Good can end or be taken away;
Something Bad can start or be presented;
Something Bad can end or be taken away.**

Consequences have to be immediate, or clearly linked to the behavior. With verbal humans, we can explain the connection between the consequence and the behavior, even if they are separated in time. For example, you might tell a friend that you'll buy dinner for them since they helped you move, or a parent might explain that the child can't go to summer camp because of her bad grades. With very young children, humans who don't have verbal skills, and animals, you can't explain the connection between the consequence and the behavior. For the animal, the consequence has to be immediate. The way to work around this is to use a bridge (see above).

Technical Terms

The technical term for "an event started" or "an item presented" is *positive*, since it's something that's *added* to the animal's environment.

The technical term for "an event ended" or "an item taken away" is *negative*, since it's something that's *subtracted* from the animal's environment.

Anything that *increases* a behavior - makes it occur more frequently, makes it stronger, or makes it more likely to occur - is termed a *reinforcer*. Often, an animal (or person) will perceive "starting Something Good" or "ending Something Bad" as something worth pursuing, and they will repeat the behaviors that seem to cause these consequences. These consequences will increase the behaviors that lead to them, so they are *reinforcers*. These are consequences the animal will work to attain, so they strengthen the behavior.

Anything that *decreases* a behavior - makes it occur less frequently, makes it weaker, or makes it less likely to occur - is termed a *punisher*. Often, an animal (or person) will perceive "ending Something Good" or "starting Something Bad" as something worth avoiding, and they will not repeat the behaviors that seem to cause these consequences. These consequences will decrease the behaviors that lead to them, so they are *punishers*.

Applying these terms to the Four Possible Consequences, you get:

Something Good can start or be presented, so behavior increases = **Positive Reinforcement (R+)**

Something Good can end or be taken away, so behavior decreases = **Negative Punishment (P-)**

Something Bad can start or be presented, so behavior decreases = **Positive Punishment (P+)**

Something Bad can end or be taken away, so behavior increases = **Negative Reinforcement (R-)**

or:

	Reinforcement (behavior increases)	Punishment (behavior decreases)
Positive (something added)	Positive Reinforcement: Something added increases behavior	Positive Punishment Something added decreases behavior
Negative (something removed)	Negative Reinforcement Something removed increases behavior	Negative Punishment Something removed decreases behavior

Remember that these definitions are based on their actual effect on the behavior in question: they must reduce or strengthen the behavior to be considered a consequence and be defined as a punishment or reinforcement. Pleasures meant as rewards but that do not strengthen a behavior are indulgences, not reinforcement; aversives meant as a behavior weakener but which do not weaken a behavior are abuse, not punishment.

Differences Between Classical & Operant Conditioning:

- **Classical conditioning is passive on the part of the learner.**
- **Operant conditioning relies on the learner to actively participate in the learning process.**
- **In operant conditioning reinforcers act as incentives for learning.**
- **Classical conditioning, on the other hand, does not provide incentives.**

USING CLASSICAL VS OPERANT CONDITIONING

What procedure (choose either classical or operant conditioning) is being described or has probably resulted in the following behavior patterns? Be able to explain why you chose the model you did.

1. In order to be able to punish my cat even when I'm not near enough to reach him, I have paired the sound of a clicker with getting squirted with water. Now the sound of the clicker causes him to startle.
 - The click is developing the same aversive properties as the water through Classical Conditioning. The Unconditioned stimulus is the water; the Unconditioned response is

the "jump" as in startle. The click starts out as a neutral stimulus, but becomes the Conditioned stimulus capable of producing the Conditioned "jump" response.

2. My cat never gets on the furniture when I am around.

- The behavior being described here is probably the result of Operant conditioning. When I am around, the cat is probably punished for getting on the furniture. He has formed a discrimination between when I'm around and when I'm not and might be getting on the furniture when I'm not around.

3. When I first start teaching about a concept, I'll praise any answer that is close to the right answer.

- This describes the process of shaping the operant behavior of answering questions. In shaping you start by reinforcing anything that is close to the final response. Then you gradually require closer and closer approximations before giving a reinforcer. So this is an example of Operant conditioning.

4. The smell of fresh bread baking makes my mouth water.

- This is probably the result of Classical conditioning. In the past the smell of the fresh bread immediately preceded putting a piece in my mouth, which causes salivation. Through the mechanism of Classical conditioning the smell itself comes to elicit salivation.

5. In a weight management class, participants earn points for every healthy meal they eat and every period of exercise they complete. Later these points result in refunds of their class fees.

- The behaviors being conditioned here are healthy eating and regular exercise. The reinforcement is the refund of the fees. So this too is Operant conditioning. The points are a version of a token system since they are exchanged for the refunds later.

6. When my son has gone for a week without arguing with his sister, he gets to choose which favorite activity he wants to engage in on Friday night.

- Here I am using Premack reinforcement by letting my son engage in a favorite activity when he has been able to refrain from arguing for a week. This is an example of differential reinforcement of other behavior, anything other than arguing will be reinforced in this Operant conditioning paradigm.

7. After the bad car accident we had last year, I cringe and break into a sweat at the sound of squealing brakes.

This is Classical conditioning. The cringing, which is an unconditioned response to pain or fear, was produced by the accident and its accompanying pain. That accident was probably preceded

by the sound of squealing brakes, which became a conditioned stimulus for the conditioned response of cringing.

8. To treat alcoholics, we sometimes put a chemical in their drinks that makes them sick. Eventually the taste of alcohol become aversive.

- This is Classical conditioning. The chemical that makes the drinker sick is being paired with the taste of alcohol so that the alcohol itself becomes the conditioned stimulus for being sick.

Setting up Operant or Classical Conditioning Strategies

1. Identify the behavior or behaviors you want to work on. Is this a classical or operant situation?

2. Do you want to increase or decrease the behavior?

If you want to increase it, list the ways you have available to do so in the appropriate type of conditioning.

OPERANT	CLASSICAL
Positive reinforcement	More pairings of CS and UCS
Negative reinforcement escape avoidance	Stronger UCS

If you want to decrease it, list the ways you have available to do so in the appropriate type of conditioning.

OPERANT	CLASSICAL
Extinction	Extinction
Punishment	Counterconditioning
Reinforce an incompatible response	Systematic Desensitization
	Exhaustion (Implosive Therapy)